

## REMARKS

In accordance with the foregoing, the specification and claim 1 have been amended. Claim 2 has been cancelled. Claims 1 and 3-12 are pending and under consideration.

### // Amendments:

#### *I-1 Amendment to the specification*

The specification has been amended as follows. Please note that the citations used below correspond to the English specification provided on November 15, 2005 (hereinafter referred to as the "05 Specification"). Please also note that the instant amendments are in addition to (not in lieu of) the amendments made to the '05 Specification in the Preliminary Amendment of November 15, 2005. The specification reflecting both sets of amendments shall be referred to as the "present specification."

Amendment to page 3, line 11 is merely a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification. Specifically, the description --by adjusting the amount of plasticizer, filler or the like-- has instantly been inserted just before "..., and it is possible to produce...."

Amendment to page 3, lines 21-22 is also a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification. Specifically, the description "ethylene acrylic acid copolymers" has instantly been amended to --ethylene-acrylic ester copolymers--.

Amendment to page 6, line 18 is also a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification. Specifically, the description --and has feeling extremely similar to a polyvinyl chloride elastomer materials,-- has instantly been inserted just before ".... and hence, ....".

Amendment to page 25, line 16 is also a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification. Specifically, the description "1,1-diphenylstyrene" has instantly been amended to --1,1-diphenylethylene--.

Amendment to page 58, line 20 is also a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification.

Specifically, the description “zinc borate and barium borate” has instantly been amended to --metal oxides (e.g., zinc borate and barium borate)--.

Amendment to page 63, line 3 is also a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification. Specifically, the description “triallyl cyanurate” has instantly been amended to --triallyl isocyanurate--.

Amendment to page 119, line 18 is also a correction of an inadvertent error which occurred at the time of the translation into English of the original Japanese PCT specification. Specifically, the description “NUC-346” has instantly been amended to --NUC-3461--.

In support of the above-mentioned amendments to page 3, line 11, page 3, lines 21-22, page 6, line 18, page 25, line 16, page 58, line 20, page 63, line 3 and page 119, line 18, Applicants attach hereto a DECLARATION to verify that the amendments are made only to correct inadvertent errors which occurred at the time of the translation into English of the original Japanese PCT specification.

Amendment to page 79, line 8 is merely a deletion of an unnecessary description. Specifically, the description “carbolic acid” has instantly been deleted.

Amendment to page 158, Table 5 has been made to correct erroneous indication of a polymer. Specifically, “Unmodified conjugated diene polymer (i)-1” appearing in the 5<sup>th</sup> row, 10<sup>th</sup> column of Table 5 (i.e., modified conjugated diene polymer (i) used in Example 8) has been amended to --Modified conjugated diene polymer (i)-1--. This error is apparent from a description of Example 8 (i.e., page 147, lines 15 to 24), which reads:

A hydrogenated copolymer-containing laminate was produced in substantially the same manner as in Example 1, except that a composition obtained by adding to adhesive composition (1) a tris (p-isocyanatophenyl)-thiophosphate-containing polyisocyanate type crosslinking agent (Desmodur RFE; manufactured and sold by Bayer AG, Germany) (hereinafter, referred to as ‘crosslinking agent-1’) in an amount of 5 parts by weight, relative to 100 parts by weight of the modified copolymer, was used instead of adhesive composition (1).

#### *I-2 Amendment to the claims*

In order to more clearly define the present invention, the Applicants have amended the claims as follows.

Claim 1 has been amended to state that the laminate of the present invention is sheet or film. Support for this amendment may be found at page 63, line 24 of the '05 Specification.

The Applicants have also amended claim 1 to incorporate therein the features of claim 2 except that the temperature range of "from -25 °C to 80 °C" recited in claim 2 (concerning the hydrogenated copolymer (I)) has been changed to "from **-20 °C** to 80 °C". Support for the more preferred temperature range of "from **-20 °C** to 80 °C" is found at page 21, line 1 of the '05 Specification.

In accordance with the amendment to claim 1, claim 2 has been cancelled.

No new matter has been introduced by the amendments.

### **/III/ The state of the art and the features and advantages of the present invention:**

#### *II-1 Background Information*

To aid the discussion of the claim rejections, the following background information is provided to put the development and advantageous features of the present invention in the proper light. As discussed in the '05 Specification under "Prior Art", conventionally, a vinyl chloride resin has been widely used in the various fields, such as a material for embossed sheets and artificial leathers (especially, skins for furniture, materials for interior of automobiles, shoe uppers, materials for bags). The hardness and dynamic properties (such as tensile strength at break) of a vinyl chloride resin can be adjusted over a wide range by adjusting the amount of plasticizer, filler or the like, and it is possible to produce a vinyl chloride resin having excellent flexibility, abrasion resistance and scratch resistance. However, from the viewpoint of reducing the weight of the materials used in the above-mentioned fields and the recent concern for a load placed on the environment when the materials are burned or decomposed, there has been an **increasing demand for a vinyl chloride resin substitute**. As examples of candidates for vinyl chloride resin substitutes, there can be mentioned olefin resins, ethylene-vinyl acetate copolymers, ethylene-acrylic ester copolymers, styrene block copolymers, and a laminate comprising a layer formed of a thermoplastic resin composition comprising a hydrogenated styrene block copolymer and polypropylene.

However, the conventional candidates for a vinyl chloride resin substitute have many problems, and **a satisfactory substitute has not yet been developed**. See '05 Specification at page 3, line 23 to page 4, line 7 and page 4, line 20 to page 5, line 7.

## *II-2 The Present Invention*

The present inventors have made extensive and intensive studies with a view toward solving the problems of the prior art. As a result, it has unexpectedly been found that the problems of the prior art can be solved by a hydrogenated copolymer-containing laminate sheet or film and the laminate sheet or film may be advantageously used as a substitute for a vinyl chloride resin sheet.

Although not limited by the following description, the hydrogenated copolymer-containing laminate sheet or film comprises a substrate layer comprising a fibrous material, an adhesive layer, and a hydrogenated copolymer composition layer. The hydrogenated copolymer composition layer may be laminated on and bonded to the substrate layer through the adhesive layer. The hydrogenated copolymer composition layer comprises a hydrogenated copolymer (I) of an amount falling within a specific range, and a rubbery polymer (II) of an amount falling within a specific range. The hydrogenated copolymer (I) may be obtained by hydrogenating a copolymer comprising conjugated diene monomer units and vinyl aromatic monomer units, and a part of the vinyl aromatic monomer units may optionally form at least one vinyl aromatic polymer block. The hydrogenated copolymer (I) may have specific characteristics with respect to a vinyl aromatic monomer unit content, a content of the vinyl aromatic polymer block, a weight average molecular weight, a hydrogenation ratio, and a glass transition temperature.

The hydrogenated copolymer-containing laminate sheet or film of the present invention has various excellent properties which are **equivalent to or higher than** those of a vinyl chloride resin sheet. Specifically, the hydrogenated copolymer-containing laminate sheet or film of the present invention has excellent properties with respect to flexibility, **calender-moldability, soft feeling at low temperatures, and anti-blocking property**,<sup>1</sup> as well as heat resistance, abrasion resistance, scratch resistance, impact resilience and the like. Therefore, the hydrogenated copolymer-containing laminate sheet or film of the present invention can be advantageously used as a **substitute for** a vinyl chloride resin sheet.

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<sup>1</sup> "Blocking" refers to unfavorably strong adhesion occurring between resin surfaces that have come into contact with each other. Blocking makes it difficult to separate such resin surfaces from each other. For example, when stacked resin shaped articles or rolled resin films are stored for a long time, blocking makes it difficult to separate the resin surfaces that have come in contact with each other as a result of the stacking or rolling.

**Claim 1** of the present invention, as amended, is directed to

A hydrogenated copolymer-containing laminate sheet or film comprising:  
 a substrate layer comprising a fibrous material,  
 an adhesive layer, and  
 a hydrogenated copolymer composition layer which is laminated on and  
 bonded to said substrate layer through said adhesive layer,  
 said hydrogenated copolymer composition layer comprising:  
 10 to 90 parts by weight of a hydrogenated copolymer (I), and  
 90 to 10 parts by weight of a rubbery polymer (II) exclusive of said  
 hydrogenated copolymer (I),  
 the total of said hydrogenated copolymer (I) and said rubbery polymer (II)  
 being 100 parts by weight,

wherein said hydrogenated copolymer (I) is obtained by hydrogenating a  
 copolymer comprising conjugated diene monomer units and vinyl aromatic  
 monomer units, a part of said vinyl aromatic monomer units optionally forming at  
 least one vinyl aromatic polymer block (A),

said hydrogenated copolymer (I) having the following characteristics (1) to  
 (5):

(1) a vinyl aromatic monomer unit content of from more than 50 % by  
 weight to 90 % by weight, based on the weight of said hydrogenated copolymer  
 (I),

(2) a content of said vinyl aromatic polymer block (A) of not more than 40  
 % by weight, based on the weight of said hydrogenated copolymer (I),

(3) a weight average molecular weight of from 50,000 to 1,000,000, and

(4) a hydrogenation ratio of 70 % or more, as measured with respect to  
 the double bonds in said conjugated diene monomer units, and

(5) at least one glass transition temperature in the range of from -20 °C to  
 80 °C,

said rubbery polymer (II) being at least one polymer selected from the  
 group consisting of:

(II-1) an unhydrogenated block copolymer comprising conjugated diene  
 monomer units and vinyl aromatic monomer units, said unhydrogenated block  
 copolymer having at least one glass transition temperature in the range of from -  
 80 °C to lower than -25 °C,

(II-2) a conjugated diene homopolymer having at least one glass transition  
 temperature in the range of from -80 °C to lower than -25 °C, or a hydrogenation  
 product thereof,

(II-3) a hydrogenated copolymer obtained by hydrogenating a random or  
 block copolymer comprising conjugated diene monomer units and vinyl aromatic  
 monomer units, said hydrogenated copolymer having a vinyl aromatic monomer  
 unit content of 50 % by weight or less, based on the weight of said hydrogenated  
 copolymer, and at least one glass transition temperature in the range of from -80  
 °C to lower than -25 °C,

(II-4) a block copolymer consisting of at least one vinyl aromatic  
 homopolymer block having a weight average molecular weight of from 2,500 to  
 40,000, and at least one isoprene homopolymer block having a vinyl bond content  
 of 40 % or more, or a hydrogenation product thereof, wherein said at least one  
 vinyl aromatic homopolymer block and said at least one isoprene homopolymer  
 block are arranged in any order,

said block copolymer (II-4) having a vinyl aromatic monomer unit content of 50 % by weight or less, based on the weight of said block copolymer (II-4), a weight average molecular weight of from 20,000 to 200,000 and at least one glass transition temperature in the range of from -25 °C to 20 °C, and (II-5) a rubbery olefin polymer having at least one glass transition temperature in the range of from -80 °C to lower than -25 °C,  
wherein said glass transition temperature of each of said polymers (I) and (II-1) to (II-5) is a temperature at which a peak of loss tangent (tanδ) is observed in a dynamic viscoelastic spectrum of the polymer.

The excellent calender-moldability, soft feeling at low temperatures, and anti-blocking property of the present invention are demonstrated through Examples 1 through 22 and Comparative Examples 1 through 4 of the present specification.

The excellent properties of the present invention are quite unexpected over the prior art, including the cited references.

**/III/ Rejection of Claims 1-12 under 35 U.S.C. § 103 as Being Unpatentable Over Watanabe et al. (USPN 6,166,143) in View of Masubuchi (JP 2001-019817).**

The office Action rejects claims 1-12 under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. (USPN 6,166,143) in view of Masubuchi (JP 2001-019827<sup>2</sup>). With respect to Watanabe et al., the Office Action asserts the following:

In regard to claims 1, 3 and 6, Watanabe et al. teach a **hose** comprising a substrate layer comprising a fibrous material, an adhesive layer and a thermoplastic elastomer layer (see, for example, col. 16, lines 35-60). The composition of Watanabe et al. has improved compatibility and has a sufficient heat resistance, oil resistance, flexibility, and low compression set and oil resistance for hoses (col. 2, lines 63-67).

Watanabe et al. fail to teach the recited mixture of polymers as the material of the thermoplastic elastomer layer. (*Emphasis added*)

Regarding Masubuchi, the Office Action asserts the following:

Masubuchi, however, disclose a thermoplastic elastomer composition that is suitable as the thermoplastic elastomer composition of a hose and of parts of appearance that corresponds to the claimed mixture of polymers that has excellent crack-proof property, pliability, the low-temperature characteristic, weatherability, intensity, and molding

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<sup>2</sup> English translation of Masubuchi Abstract included in September 29, 2006 IDS, and English translation of Masubuchi Detailed Description provided with the Office Action.

workability (see, for example, paragraphs 0043, 0006-0019 of translation). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the thermoplastic elastomer composition of Masubuchi as the thermoplastic elastomer composition of the hose of Watanabe et al. since the composition of Masubuchi has properties that are desirable for hoses such as pliability, the low-temperature characteristic and weatherability as taught by Masubuchi.

For the following reasons, the hydrogenated copolymer-containing laminate sheet or film of the present invention is not obvious from Watanabe et al. and Masubuchi.

One of ordinary skill in the art would not have combined Watanabe et al. and Masubuchi because the Watanabe et al. laminate is limited to a hose (i.e., a tubular body). This is evident from the following passages from Watanabe et al.

From the Title of Watanabe et al., it is apparent that the reference is directed to a hose:

THERMOPLASTIC ELASTOMER COMPOSITION, HOSE COMPRISING  
THERMOPLASTIC ELASTOMER COMPOSITION AND PROCESS OF  
PRODUCTION THEREOF (*emphasis added*)

This also apparent from in column 1, lines 8 to 12. A hose is the only purpose for which the thermoplastic elastomer composition is disclosed, and the chemical properties listed are all relevant to hoses:

The present invention relates to a thermoplastic elastomer composition superior in heat resistance, oil resistance, low compression set or heat aging characteristics, weatherability, low temperature properties, and oil resistance and a hose using that thermoplastic elastomer composition.  
(*emphasis added*)

Column 1, lines 19 to 21 of the Background Art section (and the Background Art section as a whole) of Watanabe et al., discusses hoses exclusively:

"Known in the art are hoses comprising an inner tube, a reinforcing layer, and an outer cover laminated on each other annularly in that order."  
(*emphasis added*)

On the other hand, the laminate of amended claim 1 comprises a sheet or film, i.e., a planar body.<sup>3</sup>

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<sup>3</sup> A "sheet" is distinguished from a "film" on page 64, lines 7 to 13 of the '05 Specification. A "sheet" is

Therefore, it is quite apparent that the laminate sheet or film of the present invention cannot be obtained by a combination Watanabe et al. and Masubuchi.

To understand why Masubuchi's thermoplastic elastomer layer is different, it should first be noted that the machine translation of Masubuchi relied upon in the Office Action is poor. Applicants respectfully submit as an **Exhibit**, a sworn partial English translation of selected passages from Masubuchi (JP 2001-019827), so that the following explanations may be properly understood.

Masubuchi discloses a thermoplastic elastomer composition comprising the following components (a) and (b):

(a) a hydrogenated conjugated diene copolymer obtained by hydrogenating a copolymer of a vinyl aromatic compound and a conjugated diene compound, the copolymer having at least one random copolymer block of the vinyl aromatic compound and the conjugated diene compound, and

(b) a polypropylene mixture of (b-1) a polypropylene copolymer having a propylene content of 85 wt% or more and (b-2) an ethylene-propylene copolymer rubber having a propylene content of 75 wt% or less.<sup>4</sup>

In Masubuchi's Working Examples, the styrene monomer unit content (i.e., vinyl aromatic monomer units) of the hydrogenated conjugated diene copolymers is 15 and 35 % by weight. See Masubuchi paragraphs [0050] and [0051]. This is **far lower** than the lower limit of 50% recited in characteristic (1) of amended claim 1. Therefore, the most preferred embodiments of Masubuchi do **not** satisfy the characteristic (1) requirement of amended claim 1.

The Office Action asserts that paragraph [0023] of Masubuchi teaches amended claim 1's rubbery polymer (II). See Office Action page 3. However, Masubuchi does not disclose the rubbery polymer (II) of amended claim 1.

Rubbery polymer (II) of amended claim 1 may further comprise (II-5), a "rubbery olefin polymer having at least one glass transition temperature in the range of from -80 °C to lower than -25 °C." The Examiner appears to believe that component (b) of Masubuchi, i.e., the "polypropylene mixture" is similar to polymer (II-5) of amended claim 1. However, this

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defined as having a thickness of more than 100 µm, preferably in the range of from more than 100 µm to 1 cm. A "film" is defined as having a thickness of 100 µm or less, preferably in the range of from 10 to 100 µm.

<sup>4</sup> See also the attached Certified translation of Masubuchi (JP 2001-019827) claim 1 and the English



understanding is incorrect. Polymer (II-5) of amended claim 1 is a “rubbery olefin polymer”, **not** a “polypropylene mixture.”

As discussed above, the machine translation of Masubuchi provided with the Office Action is of poor quality. In particular, paragraph [0023] appears to have been inaccurately translated. Below, Applicants provide a correct English language translation of paragraph [0023]:

[0023] The polypropylene mixture as component (b) used in the present invention is not a conventional mixture obtained by simply mixing together a polypropylene and an EP rubber or the like in an extruder, a Brabender or the like, but is suitably a plastoelastic polyolefin elastomer which is obtained by performing polymerization and mixing simultaneously in a reactor. In the polypropylene mixture as component (b), the rubber phase is uniformly microdispersed in the polypropylene matrix. Therefore, the polypropylene mixture as component (b) exhibits a good resistance to scratch, as compared to the case of a conventional mixture obtained by simple blending. Thus, by the use of the polypropylene mixture as component (b) in the thermoplastic elastomer composition of the present invention, the molding-processability and appearance (flow mark) of a shaped article are improved without sacrificing the scratch resistance and flexibility.” (emphasis added)

From correctly translated paragraph [0023], it is apparent that the component (b) polypropylene mixture of Masubuchi is more than an ordinary mixture. Component (b) is a special polypropylene mixture, a “plastoelastic polyolefin elastomer” obtained by simultaneously mixing and polymerizing polypropylene and an EP rubber in a reactor.

Thus, polymers (II-1) through (II-5) recited in amended claim 1, **are greatly different** from the polypropylene mixture component (b) used in Masubuchi. Therefore, Masubuchi does not disclose the rubbery polymer (II) of amended claim 1.

Additionally, the properties of Masubuchi component (b) are further evidence that component (b) is not the rubbery polymer (II) of claim 1. This is apparent from the following corrected English language translation of Masubuchi paragraph [0033]:

[0033] The amount of the polypropylene mixture component (b) in the thermoplastic elastomer composition of the present invention is 5 to 900 parts by weight, preferably 10 to 500 parts by weight, more preferably 15 to 200 parts by weight, relative to 100 parts by weight of the hydrogenated block copolymer (a). When the amount of the polypropylene mixture component (b) in the thermoplastic elastomer

composition is more than 900 parts by weight, a lowering of the rubber elasticity occurs disadvantageously. When the amount of the polypropylene mixture component (b) in the thermoplastic elastomer composition is less than 5 parts by weight, a lowering of the appearance of a shaped article of the thermoplastic elastomer composition occurs disadvantageously (that is, a flow mark occurs). (emphasis added)

The inventors found for the first time that rubbery polymer (II) imparts unexpected and/or improved properties in the laminate sheet or film. To understand the relationship between rubbery polymer (II) and the unexpected and/or improved properties of the present invention, consider page 37, line 13 to page 39, line 25 of the '05 Specification:

“ In the present invention, the rubbery polymer (II) is a polymer which is generally used as a rubber, and is exclusive of the hydrogenated copolymer (I). In the present invention, the use of the rubbery polymer (II) is essential for improving the anti-blocking property and heat resistance of the hydrogenated copolymer-containing laminate.

In the present invention, any rubbery polymers generally used in the art can be used as the rubbery polymer (II). However, it is especially preferred to use at least one polymer selected from the group consisting of:

- (II-1) .....,
- (II-2) .....,
- (II-3) .....,
- (II-4) ....., and
- (II-5) .....,

.....

The reason why the anti-blocking property and heat resistance of the hydrogenated copolymer-containing laminate can be improved by the use of the rubbery polymer (II) has not yet been elucidated, but is considered as follows. For example, in the case of the above-mentioned polymers (II-1), (II-2), (II-3) and (II-5), each of these polymers has a glass transition temperature which is lower than that of the hydrogenated copolymer (I). This fact is considered to be the reason why the above-mentioned effects can be achieved by the use of any of the above-mentioned polymers (II-1), (II-2), (II-3) and (II-5). In the case of the above-mentioned polymer (II-4), this polymer has a glass transition temperature higher than that of the hydrogenated copolymer (I); however, it is considered that the same effects as in the case of the polymers (II-1), (II-2), (II-3) and (II-5) are achieved by the use of the polymer (II-4) due to the structure thereof in which only a vinyl aromatic homopolymer block and an isoprene homopolymer block are present.” (emphasis added)

In addition to anti-blocking and heat resistance properties, the hydrogenated copolymer-containing laminate sheet or film of the present invention has excellent properties with respect to **calender-moldability**. The excellent calender-moldability properties are shown in the Working Examples of the present specification, particularly the Working Examples in Table 4 (see '05 Specification at page 157).<sup>5</sup>

As is well known in the art, calender-molding (or calendering) is a process in which a polymer is heated on hot rolls and squeezed between two or more parallel rolls into a thin sheet or film. However, the **hose** production method used in Masubuchi does not use the calender-molding technique. Instead, Masubuchi discusses injection molding, extrusion molding, and compression molding. See Masubuchi at paragraph [0042]. The Working Examples of Masubuchi use injection molding (see paragraph [0048] thereof).

Accordingly, it is clear that the excellent calender-moldability of the claimed laminate sheet or film would not have been suggested by and is completely unexpected in view of Watanabe et al. and Masubuchi, either alone or in combination.

Further, it is clear that Watanabe et al. and Masubuchi, alone or in combination, neither disclose nor would have suggested a laminate sheet or film excellent in all of heat resistance, anti-blocking property, and calender-moldability. The laminate sheet or film of the present invention is excellent in all of these properties, which is totally unexpected from the disclosures of Watanabe et al. and Masubuchi.

Therefore, the hydrogenated copolymer-containing laminate sheet or film of claim 1 of the present application is both **novel** and **non-obvious** over Watanabe et al. and Masubuchi, alone or in combination.

Thus, it is firmly believed that the rejection of claims 1-12 has been overcome, and that present application is now in condition for allowance, which is respectfully requested.

## CONCLUSION:

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

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<sup>5</sup> For the calender-moldability evaluation method, see page 123, line 20 to page 124, line 14 of the present '05 specification.

Serial No. 10/556,912

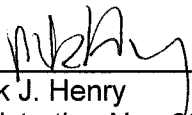
Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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